How reindeer grazing affects oroarctic mire vegetation?

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Background

- Reindeer modify tundra vegetation and soil processes, and reindeer grazing can inhibit climate change-induced tundra shrub expansion.
- Effects of reindeer grazing are not well known in wet tundra habitats like peat accumulating mires.
- We compared grazed and non-grazed mires and effects of 13-year experimental exclusion of reindeer, expecting grazing impacts to have dissipated. We further expected that reindeer exclusion has enhanced the growth and flowering of willows (Salix lapponum).

The Jaureistunturi study area

- Ten separate fens near the border of Finland and Norway (60˚ 49’ N, 23˚ 49’ E, 450-510 m a.s.l.) as study sites.
- In the mid-1950s, three-meter high reindeer fence was built along the Finnish-Norwegian border.
- The Finnish side is grazed mainly in summer.
- The Norwegian side is used as a winter range, but in the winter, reindeer feed mainly on lichens on dry habitats. Use for summer grazing has been prohibited since late 1950s.
- One characteristic feature of the studied fens is the abundance of Salix lapponum, a willow species subject to summer grazing by reindeer.

Exclosure experiment

- Grazing treatments are:
  1) free reindeer grazing that mainly takes place in summer (FI),
  2) exclusion of reindeer grazing since 2002 (FI), and
  3) no reindeer grazing since late 1950s (NO).
- Vegetation plot data sets were collected and heights of vegetation in mire ecosystems were measured in 2002, 2006 and 2015.
- The catkin production of S. lapponum in response to grazing pressure was studied in 2015.

Discussion and conclusions

- In oroarctic mires, reindeer summer grazing affects particularly S. lapponum stands and bryophyte cover
- Growth and flowering of willows enhanced after a 13-year exclusion of reindeer
- Overall, oroarctic mires are resilient to the effects of reindeer grazing
- Reindeer grazing may alter carbon cycling in mires via impact on shrub abundance, but the long-term role of mammal herbivory in mire ecosystems is still uncertain

Changes in willow height and cover over time

- As expected, grazing treatment had a significant effect on S. lapponum height and Salix spp. cover
- In 2015, downy willows (S. lapponum) were significantly more frequent in exclosures and non-grazed plots compared to freshly summer-grazed plots.

Plant community structure

- We used the 2015 pin-point cover data to compare the abundances of plant groups between grazing treatments and found a significant effect of grazing treatment on overall cover of bryophytes and Eriophorum spp.
- On average, cover of bryophytes was greatest and cover of cottongrasses lowest in non-grazed subplots.

Catkin production of S. lapponum

- Flowering female plants were significantly more abundant and had heavier and more frequent catkins in exclosures and non-grazed plots compared to summer-grazed plots.

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